Software Engineering | Batch 2021

Sustainable Design (SET111)
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Assessment Task – Design Portfolio Part 1

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Item 1 – Problem Statement

Problem Statement:

The most common problem among working professionals and students, studying or working in an IT field is back pain or neck pain. Along with this, working with a mouse everywhere is not practical as it does not function properly on all surfaces and carrying a mouse pad is not practical. So, to solve this problem I propose a design of a laptop sleeve which will not only function as a simple laptop case/cover, but also as a folding stand. Along with this, it will also feature a detachable mouse pad to make it possible to use a mouse whenever and wherever required. Separate compartments will be provided for storage of devices such as cables, mouse, keyboard, and so on. Identical to the mouse pad, a solution for the heating problem will be provided.

Design Objectives:

1. Design for reusability (Level of importance: 0.8 out of 1)

Creating a laptop sleeve which also works as a portable laptop stand and mouse pad will increase the reusability drastically as the user will not be require to buy the mouse pad as well as a stand separately. This will lead to a lot less spending on additional things.

2. Design for logistics (Level of importance: 0.2 out of 1)

Combining a laptop cover with mouse pad and stand will not drastically impact the logistics, i.e., packaging, transporting, and handling, while allowing the manufacturer to have multiple products combined into one shipped and the logistics costs will not be disturbed a lot.

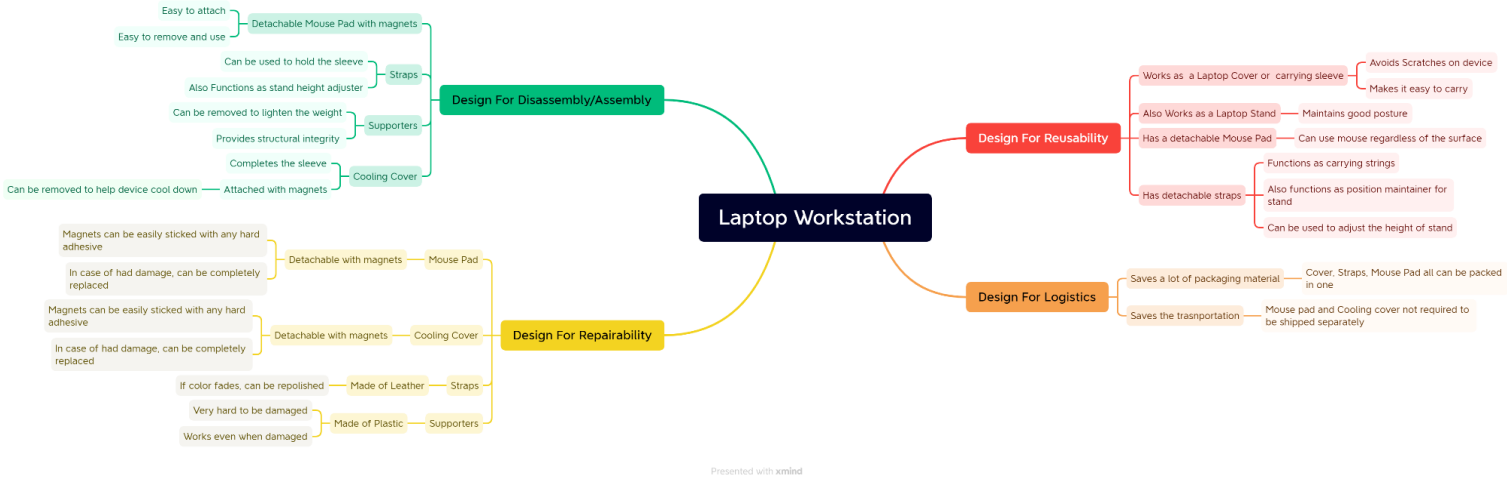
3. Design for repairability (Level of importance: 0.7 out of 1)

With such a simplistic design of the product, there is very very less scope for any damage. In case of some sort of damage, for instance, if the leather is damaged, it can be repaired easily, if the magnets of the mouse pad or cooling cover are detached due to loose gluing, some sort of strong adhesive can be applied and the problem will be solved. In conclusion, the user will not require to go to the manufacturer, or some professional to get the product repaired.

4. Design for disassembly/assembly (Level of importance: 0.8 out of 1)

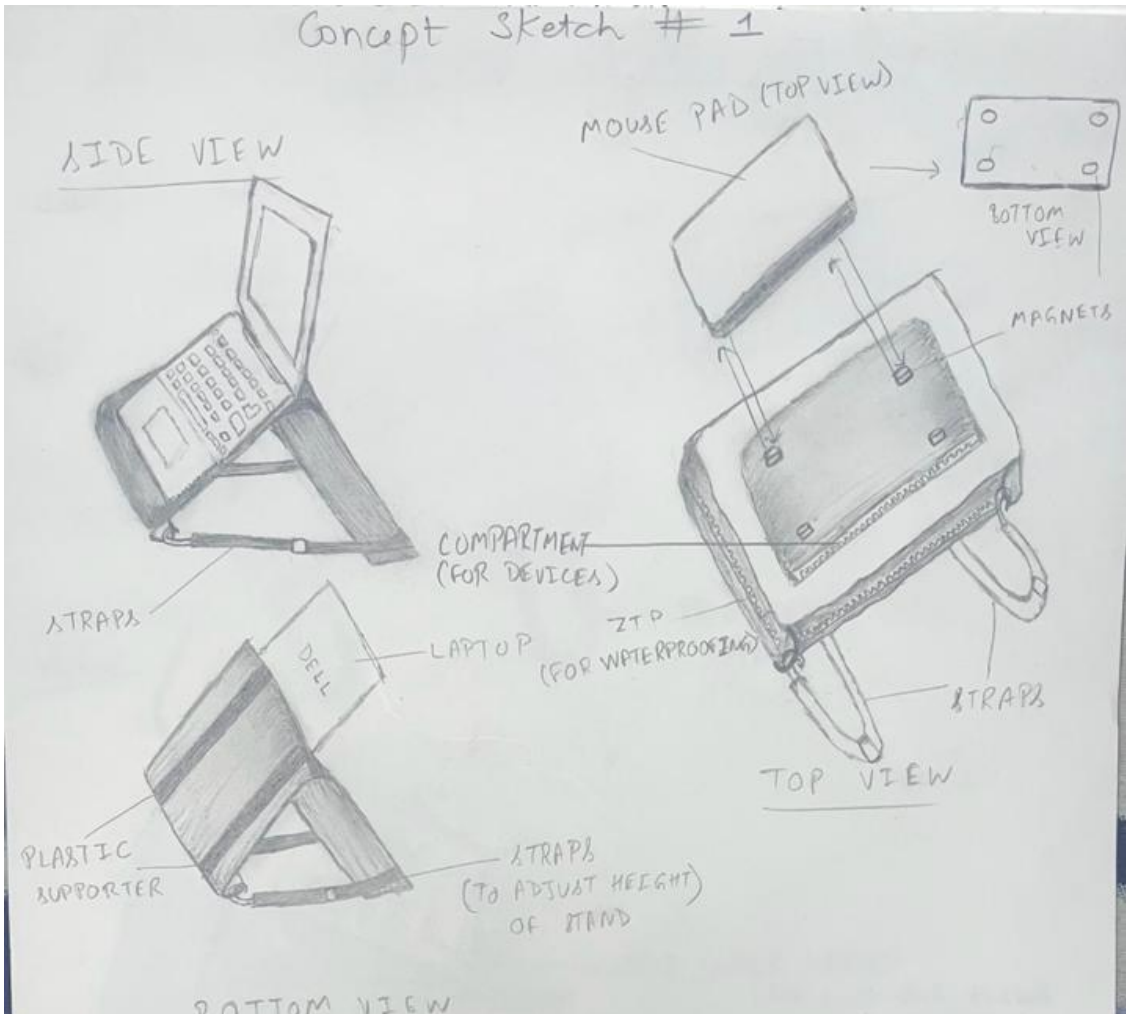
The design of this product is developed in such a way that it considers the objective of design for assembly/disassembly very deeply. To get a detailed view of this, a scenario can be considered. In this, if a person knows that he/she will not require a manual mouse, or the laptop will overheat due to heavy load on the processor,then carrying the mouse pad and cooling cover can be avoided according to the need.

Item 2 – Mind Map

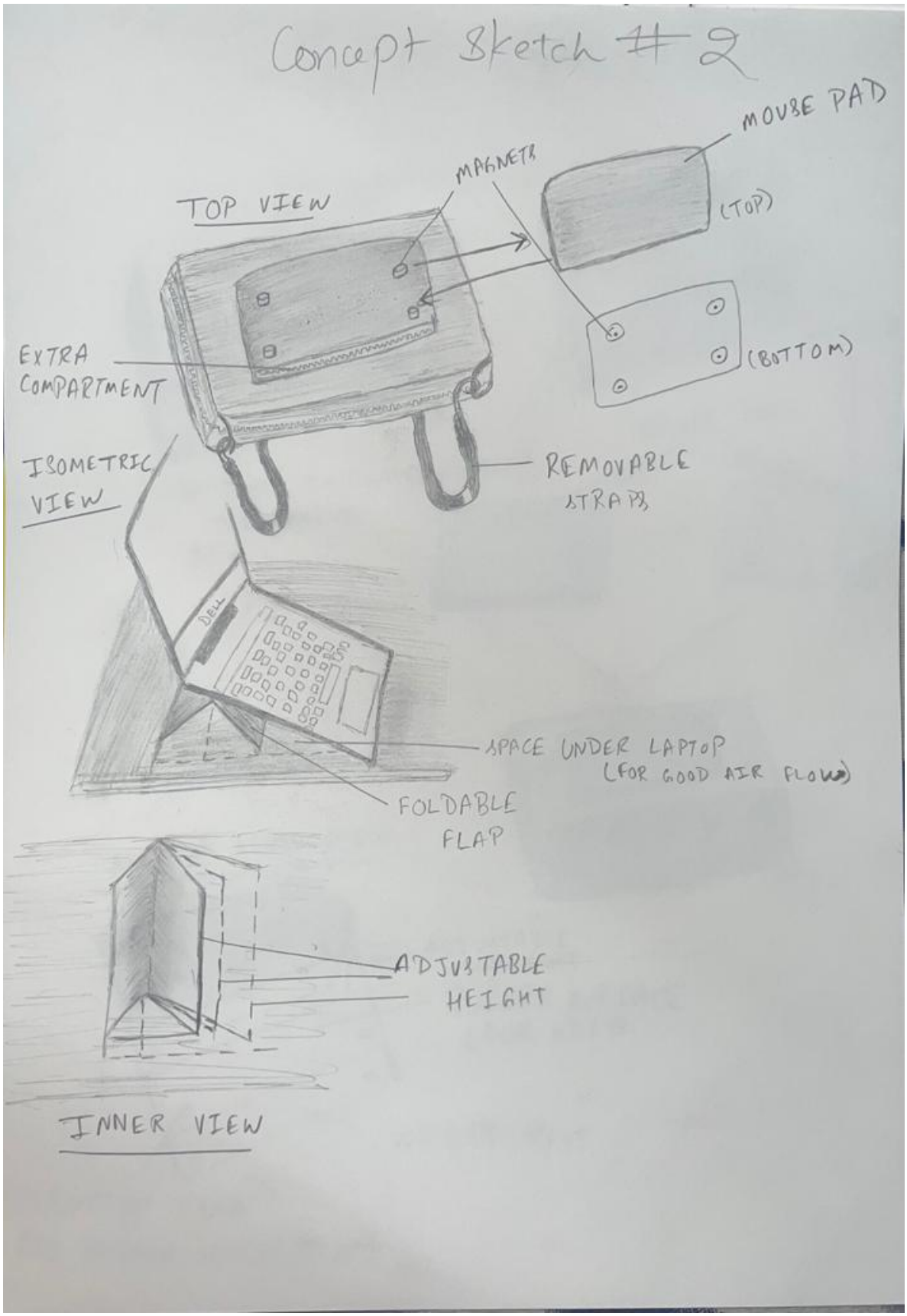


Item 3 – Concept Sketches

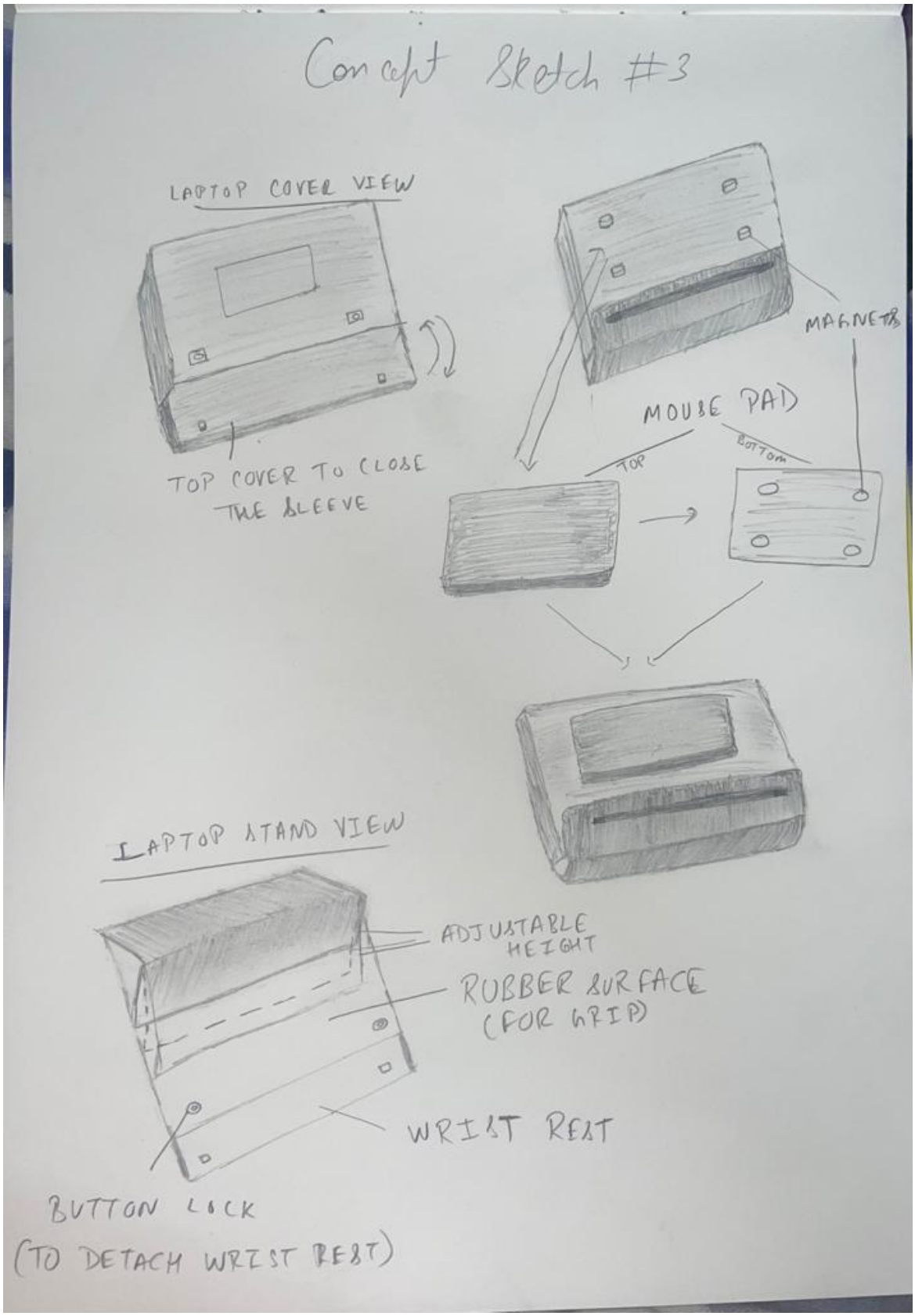
Concept 1:



Concept 2:


Concept Sketch #2
MOUSE PAD
MAGNETS
TOP VIEW
(TOP)
EXTRA COMPARTMENT
(BOTTOM)
ISOMETRIC VIEW
REMOVABLE STRAPS
DELL
SPACE UNDER LAPTOP (FOR GOOD AIR FLOW)
FOLDABLE FLAP
ADJUSTABLE HEIGHT
INNER VIEW

Concept 3:


Concept Sketch #3
LAPTOP COVER VIEW
TOP COVER TO CLOSE THE SLEEVE
MAGNETS
MOUSE PAD
TOP
BOTTOM
LAPTOP STAND VIEW
ADJUSTABLE HEIGHT
RUBBER SURFACE (FOR GRIP)
WRIST REST
BUTTON LOCK
(TO DETACH WRIST REST)

Item 4 – Evaluation of Design Alternatives

The table below gives a numerical account for the evaluation of each concept in regard to this specific design challenge. The five key design objectives outlined in the problem statement have been weighted on the left based on the following metric:

The score is then derived as the product of this importance weighting, and the given rating. The chosen rating is depicted as per the following metric which is a comparison between each of the individual concepts, and the decisions for each value are discussed and justified after the table.

Weighted Decision Matrix:

Criteria	Importance	Concept 1		Concept 2		Concept 3	
		Rank	Score	Rank	Score	Rank	Score
Dematerialisation	3	1	3	2	6	4	12
Durability	5	5	25	3	15	2	10
Cost	3	4	12	4	12	5	15
Serviceability	5	5	25	5	25	5	25
Size	4	3	12	3	12	3	12
Total			77		70		74
Rank		1		3		2	

Justification for weightage and ranking:

Dematerialisataion

Dematerialization is a reduction of the amount of materials and energy used in a design solution. It is given importance of 3 because there is not much scope available for dematerialising the laptop sleeve/cover as it has to also convert into a stand. So, to carry out both these functions, not much reduction in material can be done.

Concept 3 has the highest rating, i.e, 4 and it is so because it uses the least amount of material for the cover as its top part itself folds to become a stand for the laptop while on the contrary, concept 1 and 2 has separate mechanisms for this function.

Durability

The most crucial aspect of this product's sustainability is minimizing the amount of resources used, but lengthening its lifecycle also has several advantages. To name some, it limits the spends on repairing and replacements of spare parts and leads to better customer satisfaction.

Durability has importance rating of 5 because it is one of the most important factor any consumer considers at the time of purchase of any product. Concept 1 has the highest rank for durability as it consists of the least number of folding parts. Along with this, it also uses the various magnets and hooks, so the scope for any damage or maintenance is quite minimal.

Cost

Economic sustainability is often on par with environmental sustainability, and it is frequently at the forefront of most transactions. This is the most important aspect that a customer thinks about the most. This is why it has an importance rating of 3.

Concept 3 has rank 5 for this aspect as it requires the least amount of material for its manufacturing and this inturn leads to low cost of selling. Concept 1 and 2 have rank 4 respectively as these somewhat use identical material.

Serviceability

Serviceability considers how simple the product is to install, how simple it is to maintain, how repairable it is, and how difficult repairs would be. This too is weighed at 5 because it also plays a major role in the consumer experience. All concepts are given equal ranking as all of the concepts are quite ebay to use, assemble and disassemble. In case of repairability, every part can be easily repaired or replaced by the user without the help of any professional.

Size

Size has an importance rating of 4 as it matters a lot in the logistics and portability.
All the concepts have a ranking of 3 as all three concepts are almost identical in terms of size.

Winning Concept

Concept 1 is chosen as the design to proceed with. It comes out on top in the comparison and achieves all design goals to a high quality. The concept 1 has the highest rating as it is highly durable and its serviceability requires minimal effort. Other than this, it has the highest number of functionalities.

References:

https://www.dailyobjects.com/terracotta-red-bask-messenger-bag/dp?f=pid~TRACTA-RED-BSK-MSG-BAG&s=referer~lp